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sxRNA: Using RNA-based, nano-switches to detect novel non-coding RNA expression

Scott A Tenenbaum
SUNY, USA

The wide array of vital functions that RNA performs is dependent on its ability to dynamically fold into alternative structures in response to changes in intracellular and extracellular conditions. RNA-binding proteins (RBPs) regulate much of this activity by targeting specific RNA structures or motifs. We have developed a trans-RNA switching mechanism called structurally interacting RNA or "sxRNA" for short that relies on the unique expression of a targeted microRNA of interest to control the expression of an ectopic gene of interest. By coupling post-transcriptional gene regulation with the unique microRNA signature patterns in cell types, sxRNA technology can enable the cell specific expression of a desired protein or reporter gene to positively or negatively select for a tissue type, disease process or developmental stage. We routinely custom design sxRNAs in which the natural RBP-binding structure is altered so it only correctly forms when a targeted miRNA, binds in trans and stabilizes it by base-pairing to the flanking region. By placing sxRNA-switches downstream of a reporter gene, we have developed an RNA based, Nano-switch trans-molecular tool for scientists to measure *in vivo* miRNA production and designed multiple sxRNA switches that demonstrated increased reporter expression routinely by ~3X and as much as 15X when in the presence of the targeted miRNA. The sxRNA technology allows researchers to detect the real-time production of targeted miRNAs and and control the expression of a desired gene *in-vivo* using mRNA, rather than DNA, opens up many new possibilities for molecular tools, therapeutics, vaccines, and imaging applications.

Biography

Scott A Tenenbaum is Associate Professor of Nanobioscience at the SUNY-College of Nanoscale Science and Engineering. Previously, he served as the Acting Vice President for Research and Associate Head of the Nanobioscience Constellation at CNSE. He helped pioneer RIP-Chip/Seq technology and the field of "Ribonomics." He holds 19 issued or pending patents, which have served as the basis for three biotechnology start-up companies including his most recent, HocusLocus LLC in Upstate, NY. His research is funded by the NIH and is focused on developing RNA "Nano-switches" to be used as molecular tools, diagnostics and as therapeutics.

stenenbaum@albany.edu